

SPECIMENS EXAMINED

(All in U. S. National Herbarium, except Steyermark collections in Chicago Natural History Museum)

HUMBOLDTIELLA FERRUGINEA

VENEZUELA: *Ll. Williams 12331*, La Entrada, Carabobo (typical); *Pittier 7594*, between El Encanton and Los Teques, Aragua (typical); *Pittier 9159*, between La Victoria and Los Teques, Aragua (calyx-lobes mostly obtuse); *Pittier 5780*, La Trinidad de Maracay, Aragua; *F. Tamayo 1305*, near Guayas, Aragua; *Pittier 11956*, Los Moriches, Miranda; *A. Allart 283*, near Las Moriches, Miranda; *A. Allart 283*, near Las Mostazas, Miranda (calyx pale); *Steyermark 62403*, between Cumanacoa and Cocollar, Sucre (calyx-tube nearly 4 times the length of lateral teeth).

HUMBOLDTIELLA ARBOREA

COLOMBIA: *R. D. Metcalf 30017*, between Medellín and Antioquia, Antioquia; *Dugand & Jaramillo 2849*, between Cartegena and Turbaco, Bolívar; *H. M. Curran s. n.*, Apr.-May 1916, Island of Mompos, Bolívar; *Bro. Elias 1192*, Puerto Colombia, Atlántico; *Dugand 1181 & 323*, Barranquilla, Atlántico; *Dugand & Jaramillo 4042*, between Juanmina and Cuatrobocas, Atlántico; *Dugand 3640*, Juanmina, Atlántico; *H. H. Smith 935*, Santa Marta, Magdalena (calyx-lobes acutish).

VENEZUELA: *Pittier 10780*, near Valera, Trujillo; *Pittier 13125*, Esequé, Trujillo; *F. Tamayo 1694*, Valera, Trujillo; *Saer 230*, La Ruesga, Lara; *Saer 247*, Barquisimeto, Lara (indument ferrugineous); *A. Jahn 1197*, Humocaró, Lara; *Pittier 7665*, between Valencia and Puerto Cabello, Carabobo (typical); *Pittier 9078*, between Puerto Cabello and San Felipe, Carabobo (calyx-lobes unusually acute); *Pittier 9413*, same, in fruit (calyx-lobes blunt); *Pittier 7631*, near Valencia, Carabobo; *Pittier 10310*, between Caracas and La Guaira, Dist. Federal; *Killip & Tamayo 37053*, Santa Lucía, Miranda; *Pittier 6004*,

Squire Valley, Miranda (typical); *Pittier 7833*, Guatire, Miranda; *Pittier 11447*, El Sombrero, Guárico; *Archer 3025*, between El Sombrero and La Democracia, Guárico (typical); *Ll. Williams 12566*, El Cristo, Bolívar (calyx acute at base); *Steyermark 61488*, Bergantín, Anzoátegui; *Brown, Gillin & Bond 21*, Paria Peninsula, Sucre; *Broadway 796*, Cristóbal Colón, Sucre; *Broadway 809*, same (typical).

TRINIDAD: *Britton 478*, Teteran Bay; *Britton 485*, same (leaflets broadest below middle); *Britton, Hazen, & Mendelson 523*, Patos Island; *Britton, Freeman, & Watts 2704*, Chacachacare; *A. Fendler* in 1877-1880, without definite locality; *Britton & Broadway 466*, Lady Chancellor Road.

BRITISH GUIANA: *A. C. Smith 3092*, Kanuku Mountains.

HUMBOLDTIELLA ARBOREA × H. FERRUGINEA

VENEZUELA: *Pittier 12601*, San Pedro, Yaracuy (calyx nearest *H. arborea*; leaflets nearest *H. ferruginea*); *Pittier 8196*, between Puerto Cabello and San Esteban, Carabobo (calyx proportions of *H. arborea*, but lateral teeth rounded-deltoid; indument dense, dark); *Ll. Williams 10400*, Carmen, Aragua (calyx gibbous but tapering at base, densely hairy, the tube only twice the length of the acute lateral lobes; leaflets of *H. arborea*); *Broadway 266*, Cristóbal Colón, Sucre (calyx proportions of *H. arborea* but teeth nearly deltoid, varying to broadly obtuse; leaflet shape and size of *H. ferruginea*, but glabrous); *Broadway 813*, same (calyx proportions of *H. ferruginea* and lateral lobes acute, but vesture pale; leaflets blunt, not broadest below middle).

TRINIDAD: *Broadway s. n.*, March 7, 1930 (lateral calyx-teeth deltoid but the tube 4 times their length; indument pale); *Broadway 3619*, without definite locality (calyx proportions intermediate, the tube 3 times the length of the lateral teeth; leaflets blunt, but broadest below middle); *N. L. & E. G. Britton 2201* coastal thicket (calyx teeth deltoid but tube $3\frac{1}{2}$ times as long).

ZOOLOGY.—*Some interesting starfishes and brittle-stars dredged by the Atlantis in the mid-Atlantic.*¹ AUSTIN H. CLARK, U. S. National Museum.

The Woods Hole Oceanographic Institution has recently submitted to me for examination, through Dr. Louis W. Hutchins, a small but interesting collection of starfishes and brittle-stars dredged by the *Atlantis* in the mid-Atlantic. The expedition on which these were found, Cruise No. 150 of the *Atlantis*, was sponsored by the National Geographic Society, Columbia Uni-

versity, and the Woods Hole Oceanographic Institution. I am much indebted to the Institution and to Dr. Hutchins for the privilege of studying this collection.

The species represented in the collection are the following:

Hyphalaster parfaiti E. Perrier

Locality.—*Atlantis* station 15; mid-Atlantic west of Gibraltar (lat. 35° 37' N., long. 30° 51' W.); 3,200 meters; August 16, 1947. Seven specimens.

Notes.—The details of the seven specimens are as follows:

¹ Contribution from the Woods Hole Oceanographic Institution No. 410. Published with the permission of the Secretary of the Smithsonian Institution. Received November 5, 1947.

Specimen	R	r	Cribriform organ	United marginals
1	34 mm.	14 mm.	7	10
2	34	13	9	10
3	33	14	5	9
4	30	11	7	8
5	27	11	7	8
6	17	8	7	4
7	17	7	5	4

Pythonaster atlantidis n. sp.

Description.— $R=165$ mm, $r=28$ mm. The height at the center of the abactinal system is 26 mm. The rays are 31 mm wide at the base, tapering rapidly to 10 mm at 30 mm from the base, from this point tapering gradually to 3 mm at the tip. A shallow interradiial sulcus runs from the middle of each interradius to the center of the disk. The animal may be described as broadly stellate, with each point of the star produced into a long and slender arm.

There is no abactinal skeleton, but the skin is filled with minute rounded plates, which are almost contiguous on the disk and arm bases but become scattered on the outer part of the arms. Among these are the much larger and denser circular lenticular plates, which carry the groups of spines.

On the midline of each ray, running from the center of the disk to the end of the swollen portion of the arm bases, is a band 10–15 mm wide consisting of groups of from 2 or 3 to about 10, commonly 5 or 6, very slender and delicate spines 2–3 mm long arising from a common base on a deeply embedded lenticular plate, the whole enclosed in a bag of thick skin by which the spines are entirely concealed. In a patch about 15 mm long on the inner part of the disk these spine-containing sacculi are intermixed with papulae. On the disk this band of sacculi is bordered on each side by a patch of bare skin through which the large eggs, 2 mm in diameter, are visible. These bare patches may bear two or three sacculi including 4–7 spines. The apical region is closed by 5 large radially placed triangular flaps consisting of numerous delicate spines enclosed in a web of thick skin. The madreporite is situated at the inner end of an interradiial sulcus at the outer end of the line between two of these valves or flaps. Just beyond the central valves and bordering the interradiial sulcus for about half its length are a few cup-shaped structures consisting of about a dozen slender spines radiating upward from a common base and enclosed in thick skin.

The arms beyond the swollen basal portion are in cross section triangular with the apex rounded, about as high as broad, becoming higher than broad toward the arm tips.

The adambulacral plates have a strongly curved crest which is set at an angle of about 60° with the axis of the arm, the distal end of each crest being considerably farther inward than the proximal end of the crest following. These crests carry a row of 8–10 slender spines which are closely placed with their swollen bases contiguous and are united by a web; the innermost spines are about 1 mm long, those following gradually increasing in length to the outermost, which is 3 mm long. The outer part of each adambulacral plate bears a single much stouter spine 4 mm long, these stouter spines supporting a broad fin-like web which runs along the actinolateral border of the arm resembling the actinal web of many Pterasteridae. Beyond the proximal swollen portion of the arms the adambulacral spines become reduced in number, being usually 5.

Running upward from each adambulacral plate to the dorsolateral border is a band about 1.5 mm broad composed of numerous fine spines arising in small groups, sometimes singly, from a row of independent concretions, the whole band being enclosed in a continuous envelope of thick skin. Beyond the swollen proximal portion of the ray the bands of the two sides meet in the middorsal line. Distally these bands become narrower, the concretions bearing only 1–3 spinelets.

The pair of mouth plates is 9 mm broad at the mouth edge, 2 mm broad on the outer border, and 7 mm long. The line of union of the two plates is raised into a rounded crest. The inner border at the mouth edge is everted and curved, and the outer borders are somewhat concave. The everted inner border of each mouth plate bears 4 large spines, beyond which are 5 much smaller spines. There are no spines on the actinal surface. The mouth plates recall those of some of the Pterasteridae, as for instance *Hymenaster perissonotus*.

The mouth is circular, 23 mm in diameter. The very large stomach is empty. The tube feet, in two series, are large and stout and end in a large sucking disk.

On the arms beyond the swollen basal portion the ambulacral plates are long and slender. The sides of the lower half diverge gradually so that the end adjoining the adambulacrals is

about 2 mm broad, the central portion of the plate being only 0.5 mm wide. The upper third of the ambulacrals is abruptly broadened in the form of a broad Y with very thick arms. When viewed from the exterior the distal arm of the Y is entirely concealed by the proximal arm of the Y of the ambulacral following, which imbricates over it. This causes the ambulacrals when viewed from the exterior, to appear abruptly bent proximally, but when viewed from the interior they are seen to be straight with both arms of the Y about equal.

The adambulacrals as viewed from the actinal edge are seen to be narrowly rhombic, about 3 mm long and 0.75 mm wide. The inner side of the lower angle of the rhombic figure is abruptly swollen, appearing as if a rather thick flat pad had been soldered to it. The distal edge of this pad is evenly curved and bears the spines that form the adambulacral comb. The stout adambulacral spine is situated at about the middle, and widest part, of the adambulacral plate at some distance from the comb-bearing pad and entirely out of line with it. The adambulacral plates are strongly imbricated so that the large spine is in line with the spines of the comb of the plate following, to which it appears to belong unless the arm is cleaned, when its true relationship becomes apparent.

Just above each adambulacral and parallel to its long axis, lying practically on its surface, there is a long, slender and delicate plate 4 or 5 times as long as broad, and a little over half as long as the adambulacral; in some cases there are two of these lying closely side by side. These plates appear to be vestigial marginals.

In a line from these vestigial marginals to the midradial line, as viewed from the inner surface of the skin, there is a regular row of elongate sharply carinate plates 2 or 3 times as long as broad closely placed with their long axes parallel. Between these regular columns of elongate plates (from the center of which on the outer side spines arise) there are very numerous and closely packed minute concretions.

Distally the plates in these columns become smaller, fewer, and more widely spaced, and the concretions become more widely scattered.

Locality.—*Atlantis* station 15; mid-Atlantic west of Gibraltar (lat. 35° 37' N., long. 30° 51' W.); 3,200 meters; August 16, 1947. One specimen (type, U.S.N.M. No. E. 7175).

Notes.—The genus *Pythonaster*, the sole

genus in the family Pythonasteridae, includes only the type species *Pythonaster murrayi* Sladen described from a single specimen dredged by the *Challenger* at station 323 east of Buenos Aires, Argentina, in 1,900 fathoms, on February 28, 1876.

The type specimen of *P. murrayi* is slightly smaller than the type specimen of *P. atlantidis*, and the bases of the rays are much less swollen; but this difference may be due to the occurrence of large masses of eggs in the type of *B. atlantidis*.

According to Sladen's description and figure the actinolateral areas of *P. murrayi* are traversed by regular rows of isolated skin sacks, whereas in *P. atlantidis* these skin sacks are coalesced into continuous lines. The skin sacks on the abactinal surface of *P. murrayi* are much smaller and more widely separated than those of *P. atlantidis* in which they are almost or quite in contact.

In *P. murrayi* the adambulacral combs are composed of about 6 spines the number becoming reduced to 5 distally. In *P. atlantidis* there are 8–10 proximally, 5 distally. In *P. murrayi* the outermost and largest spine on the adambulacrals is counted as one of the comb, being united to the next by a web. In *P. atlantidis* the outermost spine on the adambulacrals is abruptly larger than the others and relatively much larger than in *P. murrayi* and is joined to the outermost spines on each side by a web, all the spines together and the web forming a continuous broad actinolateral web or fin which appears to be absent in *P. murrayi*.

The mouth plates of *P. murrayi* as figured are not of the same shape as those of *P. atlantidis*. They bear 3 or 4 large inner mouth spines and 3 small outer ones instead of 4 large and 5 small as in *P. atlantidis*. Furthermore, there are in *P. murrayi* spines on the actinal surface of the mouth plates which are not present in *P. atlantidis*; however, in the latter these may have been rubbed off during capture.

With only a single specimen of each species it is impossible to form any idea of the limits of variation. It is possible, though not probable, that *P. atlantidis* is a more fully developed example of the species represented by *P. murrayi*. It is also possible, though not probable, that *P. atlantidis* is a female of the species of which the type of *P. murrayi* is the male; but Sladen did not give the sex of his specimen.

Asteroschema inornatum Koehler

Locality.—*Atlantis* station 6; mid-Atlantic east of Bermuda (lat. 30° 06' N., long. 42° 08' W.), 1,554 meters; August 8, 1947. One specimen.

Notes.—As the original description of this species was brief and lacking in detail the following supplementary information derived from the present specimen may be of interest:

The disk is 6 mm in diameter, stellate with truncated angles and regularly incurved inter-radial borders; the outer ends of the radial shields are raised about 0.75 mm above the arm bases. The arms are about 60 mm long, slender, 1.3 mm broad at the base and tapering gradually to a delicate tip; they are only slightly higher than broad.

The disk is covered rather thickly with minute granules of coarse and spongy structure. The radial shields are rather broad, widest in the middle, the outer border having a broadly obtuse median angle, and those of each pair are almost in contact. They extend inward for about two-thirds distance to center of disk.

The first two tentacle pores have no scales. The next five have a single tentacle scale. Those following have two scales of which the large inner scale is about a segment and a half in length. At the arm tip the outer scale is only slightly longer than the inner, but neither assumes a hooklike shape. The larger inner scale is cylindrical in the basal third or fourth, from that point being less dense and tapering to the tip. The distal three-fourths bears on the outer side numerous long and slender sharp spinelets, longest near the tip, which through the dried skin appear as small conical points. There are similar but smaller spinelets on the inner side. The small outer scale is similarly armed.

There are 5 stout triangular teeth.

On the sides of the jaw plates within the mouth there are about 8 rather large and well separated granules; these are irregularly scattered, the group as a whole running upward and outward, the outermost being a pair, one on each side of the uppermost tooth.

The skin of the arms contains large delicate filmy plates that appear to form an almost continuous pavement.

The color in alcohol is pale dull pinkish, becoming dark purple on the outer half or more of the tentacle scales.

This species was described by Prof. René

Koehler (1907) on the basis of two specimens dredged by the *Talisman* in the Gulf of Gascony (the inner part of the Bay of Biscay) (lat. 45° 59' N., long. 6° 29' W.) in 1,480 meters, coral bottom, on August 30, 1883. Sanderson Smith (1888) gives this station as No. 156. Koehler gave the color in alcohol as white.

A single specimen was subsequently dredged by the *Princesse-Alice* at station 2248, in lat. 37° 02' 30" N., long. 27° 35' W., in 1,478 meters, on September 6, 1905 (Koehler, 1909). In his report on the *Princesse-Alice* echinoderms Koehler did not amplify his original description, but he gave a colored figure showing the animal as deep pink, lighter on the radial shields and becoming lighter on the arms after the basal 20 mm.

Ophiura inornata (Lyman)

Locality.—*Atlantis* station 15; mid-Atlantic west of Gibraltar (lat. 35° 37' N., long. 30° 51' W.); 3,200 meters; August 16, 1947. Seven specimens.

Notes.—In these specimens the oral shields are in most divided into two elongate plates meeting in the median line as an angle of about 90°. The jaw plates, the adoral shields, and the two sections of the oral shields are similar, and of about the same size, appearing as three similar chevrons.

In a small specimen one of the oral shields is undivided. In other cases it appears as if the third or outer chevron was composed in reality of a pair of supplementary plates intercalated between the oral shield, much reduced in size, and the adoral shields.

Opiomusium armigerum Lyman

Locality.—*Atlantis* station 15; mid-Atlantic west of Gibraltar (lat. 35° 37' N., long. 30° 51' W.); 3,200 meters; August 16, 1947. Two specimens.

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